

NON-PUBLIC?: N
ACCESSION #: 9307160085
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Calvert Cliffs, Unit 1 PAGE: 1 OF 5

DOCKET NUMBER: 05000317

TITLE: Reactor Trip Due to Turbine Trip Resulting From
Inadequate Procedure
EVENT DATE: 06/11/93 LER #: 93-004-00 REPORT DATE: 07/08/93

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 16

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
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COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On June 11, 1993, Unit 1 tripped due to an automatic actuation of the Reactor Protection System (RPS). An RPS loss of load signal was generated when the turbine tripped due to a low pressure feedwater heater (FWH) high level turbine trip signal. The signal was generated because the FWH high level dump (HLD) valve handswitch was left closed during startup. The unit was at 16 percent power.

A cause of the event was that opening the FWH HLD valves for plant startup was not adequately proceduralized. One contributing factor was that one operating crew questioned the valves position but did not effectively follow-up on the question or pass it along to the next crew who did not detect the improper handswitch positions. Procedure changes were made to open the appropriate FWH HLD valves during plant startup. The design of the FWH high and high-high level alarm circuits was reviewed. Reactor trip and normal shutdown procedures and valve lineups

will be reviewed for similar valve position problems. Troubleshooting of the FWH water level alarm circuits will be performed.

END OF ABSTRACT

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I. DESCRIPTION OF EVENT

At 12:59 p.m. on June 11, 1993, the Unit 1 reactor tripped due to an automatic actuation of the Reactor Protection System (RPS). An RPS loss of load signal was generated when the Unit 1 Turbine tripped due to a 12C low pressure feedwater heater (FWH) high level turbine trip signal. The signal was generated because the 12C FWH high level dump (HLD) valve handswitch was left closed during a Unit 1 startup, allowing a high water level in the FWH. At the time, Unit 1 was at 16 percent power (MODE 1).

Feedwater heaters use steam extracted from various stages of low and high pressure turbines to preheat feedwater. Unit 1 has six FWH stages, 11 - 16. Stage 12 has three parallel FWHs located inside the condenser, 12A, 12B and 12C. During normal power operation, the condensed extraction steam that collects in the FWHs is drained in a controlled manner to prevent the FWHs from completely flooding or draining. FWHs 12A, 12B and 12C each have a HLD valve and contain two float switches, high and high-high level. The high level float switch has two contacts, one that initiates a high level alarm on the Control Room (CR) feedwater panel and opens the FWH HLD valves, the other is the first of two contacts for a turbine trip signal. The high-high level float switch also has two contacts, one that initiates a plant computer high-high level alarm, the other is the second of the two contacts for a turbine trip signal. The turbine trip is to protect the turbine from an overspeed condition. When both turbine trip contacts are closed, a turbine trip signal is generated. The circuit has a 1.5 second time delay to prevent float chattering from causing a turbine trip.

When the plant is at a low power level, FWH pressures fluctuate with steam flow changes. As FWH pressure changes, liquid flashes to steam in the FWH and causes the float level to chatter. To preclude an inadvertent turbine trip signal generated by pressure surges from flashing liquid, the FWH HLD valves are left open during plant startup. The FWH HLD valves are controlled by handswitches from the feedwater panel in the CR.

Operating Procedure (OP) -2, "Plant Startup from Hot Standby to Minimum Load, is Attachment (2), Checklist (Reactor Trip Recovery), requires checking initial conditions for turbine startup per Operating Instruction

(OI)-43A, "Main Turbine and Generator/Exciter Operation Unit 1." One of the initial conditions for OI-43A is that FWH vents and drains are aligned per OI-8B. "Feedwater Heater Vents and Drains." OI-8B Attachment, (1), a valve lineup for the Feedwater Heater Vents and Drains, shows the difference between the startup (OPEN) and

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normal operating (SHUT) positions for the FWH HLD valves, but OI-43A does not specifically refer to Attachment (1) of OI-8B.

On the morning of June 11, 1993, preparations were being made for a Unit 1 startup after tripping the day before (see LERs 317/93-03 and 318/93-03). The Unit 1 Reactor Operator (RO) was tasked with completing OP-2 Attachment (2) for Unit 1. The Control Room Operator (CRO) coordinated various activities related to Unit 1. A Senior Reactor Operator (SRO) was dedicated to Unit 1 startup.

The SRO reported to the RO that FWH vents and drains were arranged per OI-8B after he checked the initial conditions, in OI-8B, Section II, Startup (Normal). The RO signed off step 5 of the OP-2 checklist, indicating that the initial conditions of OI-43A were met, including the OI-8B conditions.

Later during startup preparations, the SRO noted that the FWH HLD valve handswitches on the feedwater panel in the CR were in the shut position. He questioned this condition, knew they should be OPEN during the startup and discussed with the RO whether the valves should be opened. The SRO reviewed procedure steps he had completed, found no step placing the FWH HLD valve handswitches in the OPEN position, and thought a later step in the startup procedures would OPEN the FWH HLD valves prior to increasing power. Independently, the CRO cycled the FWH HLD valves per OP-2 step C.5 open and then shut. The OP-2 step does not specify valve position, only to cycle the valves, The CRO thought that FWH relief valve work going on required the valves to remain shut after cycling.

The operators on the shift brought the reactor critical just prior to the June 11 shift turnover. The next shift did not detect that the FWH HLD valves were shut and should be open. Unit 1 reached 16 percent power at 12:58. Approximately one minute before the trip, the plant computer received four 12B FWH high-high level alarms, each lasting approximately 2-2.5 seconds and resetting prior to tripping the turbine. The signals were listed on the plant computer alarm list. The plant computer alarm list is not routinely monitored because it is the secondary source of alarms for the operators. These were four of 63 plant computer alarms

listed during the minute at 12:58. No high level alarms were observed on the feedwater control panel in the CR.

At 12:59, a 12C FWH high-high level signal lasted for 2.4 seconds, meeting conditions for initiating a turbine trip and the subsequent RPS trip. Appropriate actions were taken for the plant trip.

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II. CAUSE OF EVENT

A cause of the event was that opening the FWH HLD valves for plant startup was not adequately proceduralized. Operators were aware that the FWH HLD valves needed to be open for startup, but thought the procedures would open them at the appropriate time. OI-43A did not direct the operators to verify the feedwater valve lineup, Attachment (1) in OI-8B, and no other procedural steps opened the FWH HLD valves for unit startup.

A contributing factor was that on-shift personnel preparing the unit for startup questioned why the FWH HLD handswitches were not open but did not pursue where in the procedure the valves should be opened. They assumed the valves would be opened later in the procedure and therefore did not convey this question to the oncoming shift. Additionally, the oncoming crew did not detect the handswitches were out of position during shift turnover or subsequent activities.

If the FWH high level alarms on the feedwater panel in the CR had alarmed before the trip, they might have alerted the operators to the fact that the FWH HLD valve handswitches were in the SHUT position in time to prevent the trip. However, during Unit startup, when flashing in the FWHs is more likely to cause spurious alarms than during normal operations, such trips are prevented by opening the FWH HLD valves as a routine part of the startup.

III. ANALYSIS OF EVENT

The event is reportable under 10 CFR 50.73(a)(2)(iv), as a condition that resulted in an automatic RPS actuation. The reactor tripped as designed for a loss of load trip. All protective systems performed as expected and operators performed their tasks correctly and interpreted indications properly. The turbine trip signal from the 12C FWH was probably generated by liquid flashing to steam in the FWH during startup. The 12B FWH high-high level alarms may have occurred due to localized steam flashing causing the high-high level float to close its contacts, while the high level float did not experience simultaneous flashing, resulting in no plant trip. It is unclear why no high level alarm was observed for

12C FWH and the turbine trip signal was still generated. The turbine trip signal protects the turbine, not the reactor. The loss of load reactor trip performed properly. There were no significant safety consequences as a result of this event.

IV. CORRECTIVE ACTIONS

Appropriate actions were taken for the plant trip.

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Procedure changes were made to open the appropriate FWH HLD valves during plant startup.

We understand that procedures are not the only barrier to ensure event free operation. We expect operators to pay careful attention to detail while performing tasks. The General Supervisor-Nuclear Plant Operations has recently reemphasized these expectations via his daily Notes and Instructions to the crews.

Reactor trip and normal shutdown procedures and valve lineups will be reviewed for trip-sensitive valves left in a post-trip or shutdown position different from the required startup position.

We evaluated the design of the 12 FWH high and high-high level alarm circuits and found them to be appropriate for their intended function. This evaluation identified no explanation why the high level alarm was not observed for the 12C FWH high level condition.

Troubleshooting of the 12 FWH high and high-high level alarm circuits will be performed to try to determine why the turbine trip occurred without receiving FWH high level alarms.

V. ADDITIONAL INFORMATION

A. Affected Component Identification

EIIS EIIS

Component Funct Code System Code

FWH HLD valve LSV SJ

B. Previous Similar Events

There have been three previous events involving plant trips related to the FWH HLD valves, but the previous causes were unrelated to this event. They were documented in Unit 1 LERs

85-011, 85-012, and 88-005.

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BALTIMORE
GAS AND ELECTRIC

CALVERT CLIFFS NUCLEAR POWER PLANT
1650 CALVERT CLIFFS PARKWAY o LUSBY, MARYLAND 20657-4702

CHARLES H. CRUSE
PLANT GENERAL MANAGER
CALVERT CLIFFS July 8, 1993

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit No. 1; Docket No. 50-317; License No. DPR 53
Licensee Event Report 93-004
Reactor Trip Due to Turbine Trip Resulting from Inadequate
Procedure

The attached report is being sent to you as required under 10 CFR 50.73
guidelines. Should you have any questions regarding this report, we will
be pleased to discuss them with you.

Very truly yours,

CHC/JV/bjd
Attachment

cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
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